

FIFTH YEAR RESULTS OF THE 1999-2003 ALFALFA FORAGE VARIETY TRIAL

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Introduction

Increasing dairy herds in Oregon and Idaho, and increasing exports of alfalfa cubes, compressed bales, and pellets to nations across the Pacific create a marketing opportunity for premium and supreme quality hay. Quality hay can be obtained by cutting alfalfa early, in the pre-bud to bud stage, but before flowering. Total yield will be lower than it could be with cutting later. However, when there is strong demand for high quality hay, the increased market value may more than compensate for lower yield.

Producing premium quality hay involves increased risk. Repeated early cutting reduces stored carbohydrate in the roots and can result in thinning stands or a shorter life of the stand. Alfalfa stressed by repeated early cutting is more susceptible to pests and diseases that may be present in the field. Varieties can vary in their ability to withstand frequent cutting, diseases, and insects.

In this 5-year trial, 12 proprietary varieties were compared to 2 public check varieties for production of high quality hay. The purpose of this trial was to identify alfalfa varieties that can remain productive when cut early for high quality hay. The trial was established on a marginally productive, alkaline soil with sprinkler irrigation, characteristic of a soil and irrigation system often used for alfalfa hay production.

Methods

The trial was established in September 1998, on Nyssa silt loam that had not been deep plowed. Details of this trial's establishment are in a previous annual report (Eldredge et al. 2000), which is also posted on the internet at: <http://www.cropinfo.net/AnnualReports/1999/alf99A2est.htm>.

Plots were 20 ft long by 5 ft wide, separated at their ends by 3-ft alleys, with each variety replicated five times in a randomized complete block design. Fall regrowth was mowed with a flail mower and removed from the field on November 14, 2002 to reduce soil cover and improve herbicide spray penetration and effectiveness. Soil cover during winter can also promote rodent colonization of the alfalfa stand.

The alfalfa was harvested on May 7, June 18, July 17, and August 12, 2003. The cuttings were taken when the majority of the plants were at bud stage, with some plants in some plots in early bloom. At each cutting date, a 3-ft by 20-ft swath was cut from the center of each plot using a flail mower, and the alfalfa was weighed. Ten random

samples of alfalfa were collected over the entire field before each cutting, dried in a forage drier at 140°F with forced air, and re-weighed to determine the moisture content at each cutting. Yield was reported based on alfalfa hay at 88 percent dry matter. Sprinkler irrigation was resumed the day after each cutting date.

Samples of the stems from approximately 1 ft of row per plot were taken on June 18, just before the second cutting, to measure forage quality. The forage dryer fan motor failed before the samples were dry, so those samples were discarded. Another set of samples were taken from each plot on August 11, just before the fourth cutting, and dried in the forage drier. The dried forage samples were ground to pass a 1-mm screen, subsampled, and sent to the Oregon State University Forage Quality Lab at Klamath Falls, Oregon, where they were reground to pass a 0.5-mm screen. Near infrared spectroscopy (NIRS) was used to estimate percent crude protein, percent acid detergent fiber (ADF), and percent neutral detergent fiber (NDF). Relative feed quality (RFQ) was calculated by the formula:

$$\text{RFQ} = \{[88.9 - (\text{ADF} * 0.779)] * (120/\text{NDF})\}/1.29$$

Quality standards based on RFQ are: Supreme, RFQ higher than 180, Premium, RFQ 150-179; Good, RFQ 149-125; Fair, RFQ 124-100; and Low, RFQ 99 or lower. Hay with a higher RFQ requires less grain or feed concentrate to formulate the dairy ration.

Results and Discussion

The average fifth-year total hay yield was 4.36 ton/acre (Table 1). There were no significant differences in hay yield between varieties in any cuttings. The crude protein, which averaged 23.6 percent in the fourth cutting, ranged from 22.5 percent for 'Lahontan' to 24.6 percent for 'W-L 325 HQ'. Acid detergent fiber, ADF, averaged 26.7 percent. Neutral detergent fiber, NDF, averaged 32.1 percent. All varieties produced Premium quality hay in the fourth cutting, with RFQ higher than 179.

Over the 5 years, hay yield averaged 5.6 ton/acre/year (Table 2). Information on the disease, nematode, and insect resistance of the varieties in this trial was provided by the participating seed companies and/or the North American Alfalfa Improvement Council (Table 3). Most alfalfa varieties have some resistance to diseases and pests that could limit hay production in northeastern Malheur County. Growers should choose varieties that have stronger resistance ratings for disease or pest problems known to be present in their fields. The yield potential of a variety should be evaluated based on performance in replicated trials at multiple sites over multiple years.

References

Eldredge, E. P., C.C. Shock, and L. D. Saunders. 2000. First year yield of the 1999-2003 alfalfa forage variety trial. Malheur Experiment Station Annual Report, Oregon State University Agricultural Experiment Station Special Report 1015:12-15.

Table 1. Alfalfa variety hay yields and fourth cutting crude protein*, ADF*, NDF*, relative feed value, and relative feed quality for 2003, Malheur Experiment Station, Oregon State University, Ontario, OR.

Variety	Cutting date				2003 total	Crude protein	ADF [†]	NDF [‡]	Relative feed quality
	5/7	6/18	7/17 [§]	8/12					
	ton/acre [§]				% of DW [¶]				
W-L 325HQ	1.25	1.43	1.08	0.98	4.74	24.6	25.8	31.1	207.1
Surpass	1.28	1.36	1.00	1.02	4.65	24.1	26.8	32.2	197.6
Gold Plus	1.10	1.35	1.03	1.06	4.54	23.1	29.0	34.7	178.5
Tango	1.17	1.42	1.07	0.88	4.53	22.9	27.6	33.1	192.1
Wrangler	1.13	1.37	0.98	0.99	4.47	23.5	27.2	32.6	193.3
G9722	1.17	1.29	0.96	0.98	4.40	23.2	27.2	32.8	192.1
ZX9453	1.13	1.32	1.01	0.87	4.33	23.3	27.1	32.5	196.0
DK 142	1.06	1.33	1.02	0.92	4.33	23.1	27.3	32.9	192.3
Rambo	1.06	1.33	0.96	0.92	4.27	23.7	26.3	31.6	201.6
Emperor	1.13	1.29	0.91	0.90	4.23	24.3	24.3	29.4	222.8
Archer II	1.14	1.30	0.94	0.85	4.22	23.7	26.7	32.1	198.6
Plumas	1.06	1.20	0.98	0.94	4.18	23.8	25.4	30.8	210.6
Multi-5301	0.99	1.27	0.91	0.93	4.11	24.4	25.1	30.1	214.7
Lahontan	1.02	1.18	0.95	0.92	4.07	22.5	27.7	33.0	192.2
Mean	1.12	1.32	0.99	0.94	4.36	23.6	26.7	32.1	199.2
LSD(0.05)	NS ^{††}	NS	NS	NS	NS	NS	NS	NS	NS

*Based on percent of dry weight.

[†] ADF: acid detergent fiber.

[‡] NDF: neutral detergent fiber.

[§] Yield at 88 percent dry matter.

[¶] DW: dry weight.

^{††} NS: not significant.

Table 2. Forage yield of alfalfa varieties over 5 production years, Malheur Experiment Station, Oregon State University, Ontario, 2003.

Variety	1999	2000	2001	2002	2003	5-year	
						Total	Average
-----ton/acre*-----							
Surpass	3.68	7.43	6.35	7.08	4.65	29.19	5.84
Rambo	4.22	7.41	6.28	6.84	4.27	29.02	5.80
Tango	4.42	7.61	5.76	6.38	4.53	28.70	5.74
ZX9453	3.83	7.68	6.19	6.62	4.33	28.65	5.73
Emperor	4.55	7.60	5.76	6.46	4.23	28.60	5.72
W-L 325 HQ	4.36	7.82	5.37	6.30	4.74	28.59	5.72
G9722	4.57	7.54	5.63	6.38	4.40	28.52	5.70
Archer II	4.62	7.52	5.81	6.32	4.22	28.49	5.70
DK 142	4.25	7.32	5.66	6.52	4.33	28.08	5.62
Gold Plus	3.75	7.71	5.42	6.24	4.54	27.66	5.53
Wrangler	4.37	6.86	5.53	6.26	4.47	27.49	5.50
Plumas	3.85	7.29	5.66	6.34	4.18	27.32	5.46
Multi-5301	3.99	7.52	4.79	5.86	4.11	26.27	5.25
Lahontan	4.20	6.17	5.25	5.68	4.07	25.37	5.07
Mean	4.19	7.39	5.68	6.38	4.36	28.00	5.60
LSD (0.05)	NS	0.67	NS	NS	NS	NS	NS

*Yield at 88 percent dry matter.

Table 3. Variety source, year of release, fall dormancy, and level of resistance to pests and diseases for 14 varieties in the 1999-2003 forage variety trial, Malheur Experiment Station, Oregon State University, Ontario, OR, 2003.

Variety	Source	Release		Pest resistance rating [‡]									
		year	FD [†]	BW	FW	VW	PRR	AN	SAA	PA	SN	AP	RKN
Lahontan	public	54	6 [§]	MR	LR	-	LR	-	MR	LR	R	-	-
Wrangler	public	84	2	R	R	LR	HR	LR	HR	HR	-	-	-
Surpass	Andrews Seed	85	3	HR	HR	R	R	MR	-	R	-	-	-
Rambo	ABI Alfalfa	95	3	HR	HR	R	HR	HR	MR	R	R	R	-
DK 142	DeKalb	96	4	HR	HR	R	HR	R	R	HR	R	HR	-
Tango	Eureka Seeds	97	6	MR	HR	HR	HR	HR	HR	HR	MR	-	R
WL 325 HQ	W-L Research	97	3	HR	HR	R	HR	HR	R	R	R	R	-
Archer II	ABI Alfalfa	98	5	R	HR	HR	R	HR	R	MR	R	LR	R
Emperor	ABI Alfalfa	98	4	HR	HR	HR	HR	HR	MR	R	-	HR	-
Gold Plus	MBS Inc.	98	4	HR	HR	R	HR	HR	HR	HR	HR	R	-
Multi-5301	Geertson Seed	98	4	R	HR	R	MR	HR	-	R	-	R	-
Plumas	Eureka Seeds	98	4	R	HR	R	HR	HR	HR	R	HR	R	MR
ZX9453	ABI Alfalfa	-	5	-	HR	R	R	MR	R	R	HR	-	MR
G9722	Geertson Seed	-	6	R	R	-	R	-	R	HR	-	-	-

[†]FD: fall dormancy, BW: bacterial wilt, FW: Fusarium wilt, VW: Verticillium wilt, PRR: Phytophthora root rot, AN: Anthracnose, SAA: spotted alfalfa aphid, PA: pea aphid, SN: stem nematode, AP: Aphanomyces, RKN: root knot nematode (Northern).

[§]Fall Dormancy: 1 = Norseman, 2 = Vernal, 3 = Ranger, 4 = Saranac, 5 = DuPuits, 6 = Lahontan, 7 = Mesilla, 8 = Moapa 69, 9 = CUF 101.

[‡]Pest Resistance Rating: >50% = HR (high resistance), 31-50% = R (resistant), 15-30% = MR (moderate resistance), 6-14% = LR (low resistance)